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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,317	10/20/2003	Hyun T. Kim	2003-0551.00/US	4522

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EXAMINER

GUERRERO, MARIA F

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 09/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/690,317

Applicant(s)

KIM ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 19-33 is/are pending in the application.
- 4a) Of the above claim(s) 22-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 19-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. This Office Action is in response to the Amendment filed July 18, 2005.

#### **Status of Claims**

2. Claims 1-18 are canceled. Claims 19-33 are pending.

#### ***Election/Restrictions***

3. Newly submitted claims 22-33 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the claims require a cleaning process.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 22-33 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al. (US 5,296,400) in view of Ravi et al. (US 6,548,313).

Park et al. shows a method of fabricating a transistor source/drain connection between adjacent transistor gate structures (Abstract). Park et al. discloses depositing a filler material at least in a region between the adjacent transistor gate structures (Fig. 2B). Park et al. teaches removing the filler material with a process having removal selectivity to nitride greater than 40:1 to form a contact opening and depositing a conductive material (polysilicon) in the contact opening (Fig. 2D-2F, col. 4, lines 10-25, col. 52-65).

Park et al. does not specifically show depositing and planarizing an amorphous carbon filler material. However, Ravi et al. teaches depositing and planarizing the amorphous carbon filler material between adjacent transistor gate structures as well known in the art (Fig. 4-5A, 9B, col. 2, lines 60-65, col. 3, lines 1-6, 24-60).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Park et al. reference by including the amorphous carbon filler material and the planarizing step as taught by Ravi et al. in order to facilitate the etching process and to improve etch selectivity (Ravi et al., col. 3, lines 1-6).

5. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wei et al. (US 6,423,645) in view of Ravi et al. (US 6,548,313).

Wei et al. shows a method of fabricating a transistor source/drain connection between adjacent transistor gate structures (col. 3, lines 50-60). Wei et al. discloses depositing an amorphous carbon filler material at least in a region between the adjacent transistor gate structures (col. 3, lines 8-17, col. 4, lines 27-35). Wei et al. teaches selectively dry developing the carbon filler material to form a contact opening and

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depositing a polysilicon material in the contact opening (Abstract, Fig. 7, col. 1, lines 5-20, col. 3, lines 60-67, col. 4, lines 27-35).

Wei et al. does not specifically show planarizing the amorphous carbon filler material such that the planarized amorphous carbon filler material remains only between the adjacent transistor gate structures. However, Ravi et al. teaches planarizing the amorphous carbon filler material such that the planarized amorphous carbon filler material remains only between the adjacent transistor gate structures (Fig. 4-5A, 9B, col. 2, lines 60-65, col. 3, lines 1-6, 24-60).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Wei et al. reference by including the planarizing step as taught by Ravi et al. in order to facilitate the etching process (col. 3, lines 1-6).

6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al. (US 5,296,400) in view of Ha (U.S. 6,451,708) and Ravi et al. (US 6,548,313).

Park et al. shows a method of fabricating a transistor source/drain connection between adjacent transistor gate structures (Abstract). Park et al. discloses depositing a filler material at least in a region between the adjacent transistor gate structures (Fig. 2B).

Park et al. teaches removing the filler material with a process having removal selectivity to nitride greater than 40:1 to form a contact opening and depositing a conductive material in the contact opening (Fig. 2D-2F, col. 4, lines 10-25, col. 52-65).

Park et al. does not specifically show depositing and planarizing an amorphous carbon filler material. However, Ravi et al. teaches depositing and planarizing the

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amorphous carbon filler material between adjacent transistor gate structures as well known in the art (Fig. 4-5A, 9B, col. 2, lines 60-65, col. 3, lines 1-6, 24-60).

Park et al. does not specifically show the aspect ratio being greater than about 5:1. However, Ha shows forming a contact opening having the aspect ratio greater than about 5:1 (col. 6, lines 40-65).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Park et al. reference by including the amorphous carbon filler material and the planarizing step as taught by Ravi et al. in order to facilitate the etching process and to improve etch selectivity (Ravi et al., col. 3, lines 1-6) and to specify the aspect ratio being greater than about 5:1 as taught by Ha in order to obtain a high aspect ratio contact holes concurrently in the cell array a region and the peripheral circuit region without increasing the process steps and the cost (Ha, col. 2, lines 45-67).

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 19-21 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lim et al. (US 6,380,106) is cited as evidence to show that the use of amorphous carbon as a filler material is conventional in the art.

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 23, 2005

  
**MARIA F. GUERRERO**  
**PRIMARY EXAMINER**